## **CLAIMS**

## What is claimed is:

- 1. A method of producing a protein bioarray comprising:
  - a) providing a substrate comprising a solid support and a surface modification layer bound to the solid support, the surface modification layer comprising at least a first moiety having the structure —Si—R<sup>1</sup> and a second moiety having the structure Si—L—R<sup>2</sup>, wherein R<sup>1</sup> is a chemically inert moiety selected from the group consisting of C<sub>3</sub> to C<sub>30</sub> alkyl and benzyl optionally substituted with 1 to 5 halogen atoms, L is a linking group, R<sup>2</sup> is a chemically inert hydrophilic moiety,
  - b) providing at least two solutions, each solution comprising a probe protein, and
  - c) depositing the solutions provided in step b) onto discrete sites on the substrate, each solution being deposited onto its own discrete site, wherein each probe protein becomes non-covalently attached to the substrate at its respective discrete site.
- 2. The method of claim 1, further comprising drying the substrate after depositing the solutions.
- 3. The method of claim 1, further comprising, after step c),
  - d) contacting the substrate with a blocking composition comprising a blocking protein, wherein the blocking protein becomes non-covalently attached to the substrate
- 4. The method of claim 3, wherein the discrete sites are separated by intervening areas, and the blocking protein becomes non-covalently attached to the substrate at the intervening areas and at the discrete sites.
- 5. The method of claim 3, wherein the blocking composition comprises a plurality of blocking proteins.
- 6. The method of claim 5, wherein the plurality of blocking proteins are selected to provide low background signal relative to binding of target protein by the probe proteins.

- 7. The method of claim 1, wherein at least one solution provided in step b) comprises a probe protein that is different from at least one other probe protein in another solution provided in step b).
- 8. The method of claim 1, wherein least fifty solutions are provided in step b).
- 9. The method of claim 1, wherein least 250 solutions are provided in step b).
- 10. The method of claim 1, wherein depositing the solutions comprises using an inkjet apparatus to deliver one or more droplets of each solution to its respective discrete site.

## 11. A protein bioarray comprising

- a substrate comprising a solid support and a surface modification layer bound to the solid support, the surface modification layer comprising at least a first moiety having the structure —Si—R<sup>1</sup> and a second moiety having the structure —Si—L—R<sup>2</sup>, wherein R<sup>1</sup> is a chemically inert moiety selected from the group consisting of C<sub>3</sub> to C<sub>30</sub> alkyl and benzyl optionally substituted with 1 to 5 halogen atoms, L is a linking group, R<sup>2</sup> is a chemically inert hydrophilic moiety;
- a plurality of discrete sites on the substrate, each site having a probe protein bound thereto via non-covalent interaction.
- 12. The protein bioarray of claim 11, further comprising intervening areas between the discrete sites.
- 13. The protein bioarray of claim 11, further comprising a blocking protein bound to the substrate.
- 14 The protein bioarray of claim 11, wherein each discrete site is in the range from 30 to 150 micrometers in diameter.
- 15 The protein bioarray of claim 11, wherein the solid support comprises a material selected from glass; fused silica; plastic, polytetrafluoroethylene, polystyrene, polycarbonate, ceramic, titanium dioxide.

- 16. The protein bioarray of claim 11, wherein the second moiety comprises from about 0.5% to about 99.5% of the modification layer.
- 17. The protein bioarray of claim 11, wherein the second moiety comprises from about 0.5% to about 30% of the modification layer.
- 18. The protein bioarray of claim 11, wherein  $R^2$  is selected from hydroxyl, acetyl, carboxyl, amino, amide, methoxyl, ethoxyl, propoxyl, and — $(OCH_2CH_2)_k$ —H where k is an integer from 1 to about 10.